FIG. 1

100

data
102

104

108
109
110
106
COP

112

114
102
116
106
118
122

FIG 2

200

POWER

202

204A 204B

206A 206B

10 GHz

20 GHz

FREQUENCY

FIG. 3A

FIG. 3B

300

301
302
304 OCDP
310
312 Em
314 R

OCDP DATA
R7
306 X
308 N
304A
304B + f₂
331
R2 + 1/2 r₂

301
312 Em
313 Em
304
308 N
306 ⊗
N₂ R₂
315 S

FIG. 4   400

Sinusoidal O_COP Carrier pair

407

⊗ ~408

Differential Encoder   404

PAIR OF O_COP CARRIERS PRBS   402

BPF:

External Optical Modulator   ~414

External Optical Modulator

NRZ Digital Line Data   ~420   422

418   416

424   428   432

430   426

402

410

412

FIG. 5   500

Switch to Measure System Noise

⊗   524

Differential Encoder   526

THE PAIR OF O_COP carries PRBS   528

BPF:

522   520

~506

⊕

NRZ Digital Line Data   o/s

~508

510   512   514   516   504

External Optical Modulator   system line- TX   522

FIG. 6

628

600

630

| LPF: | Analog-to-Digital (A/D) converter 50 MSPS | PC (computer) Signal processing |

526

632

634

BPF

BPF:

625

623

526

512 — 612 610

optical isolator

A

608

603

524

optical isolator

A

620

617 616

614

604 602

From cable System

605 ~ To data Receiver for NRZ Digital data (:

Figure

712

716 7

| LPF: | Analog-to-Digital (A/D) converter (10 MSPS) | Signal Processing |

710

714

720

716

703

705

BPF:

BPF

O_COP Local Oscillator

RF

702

718

701

704

Optical isolator

A

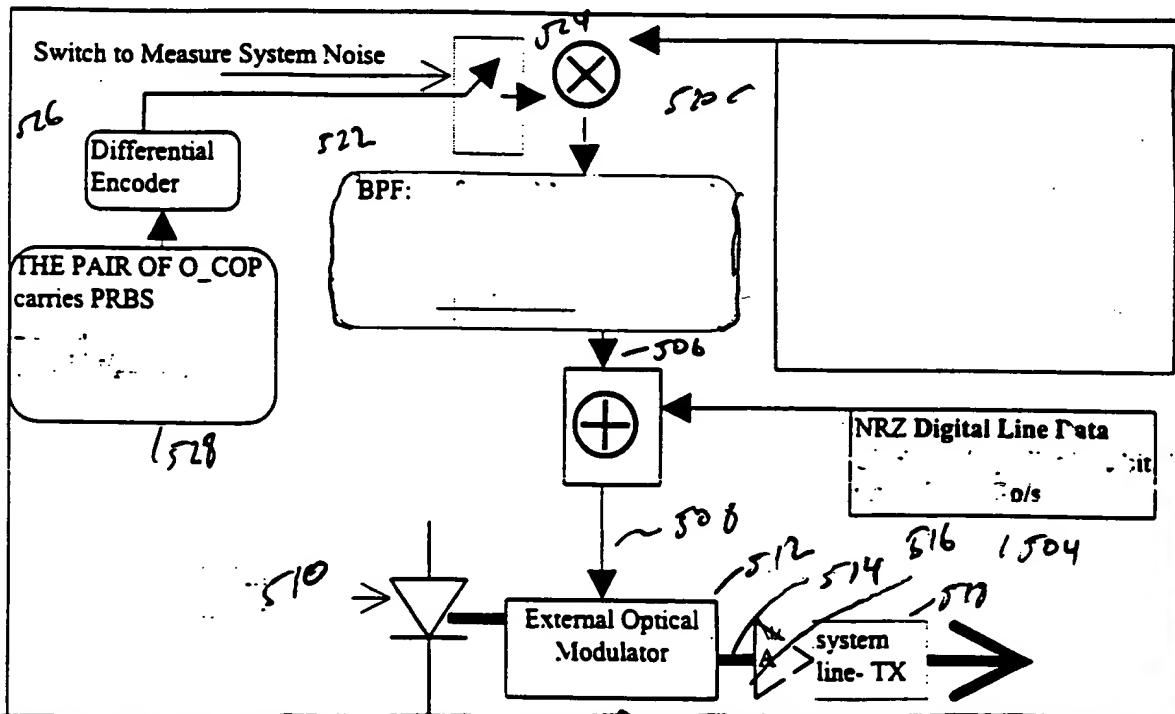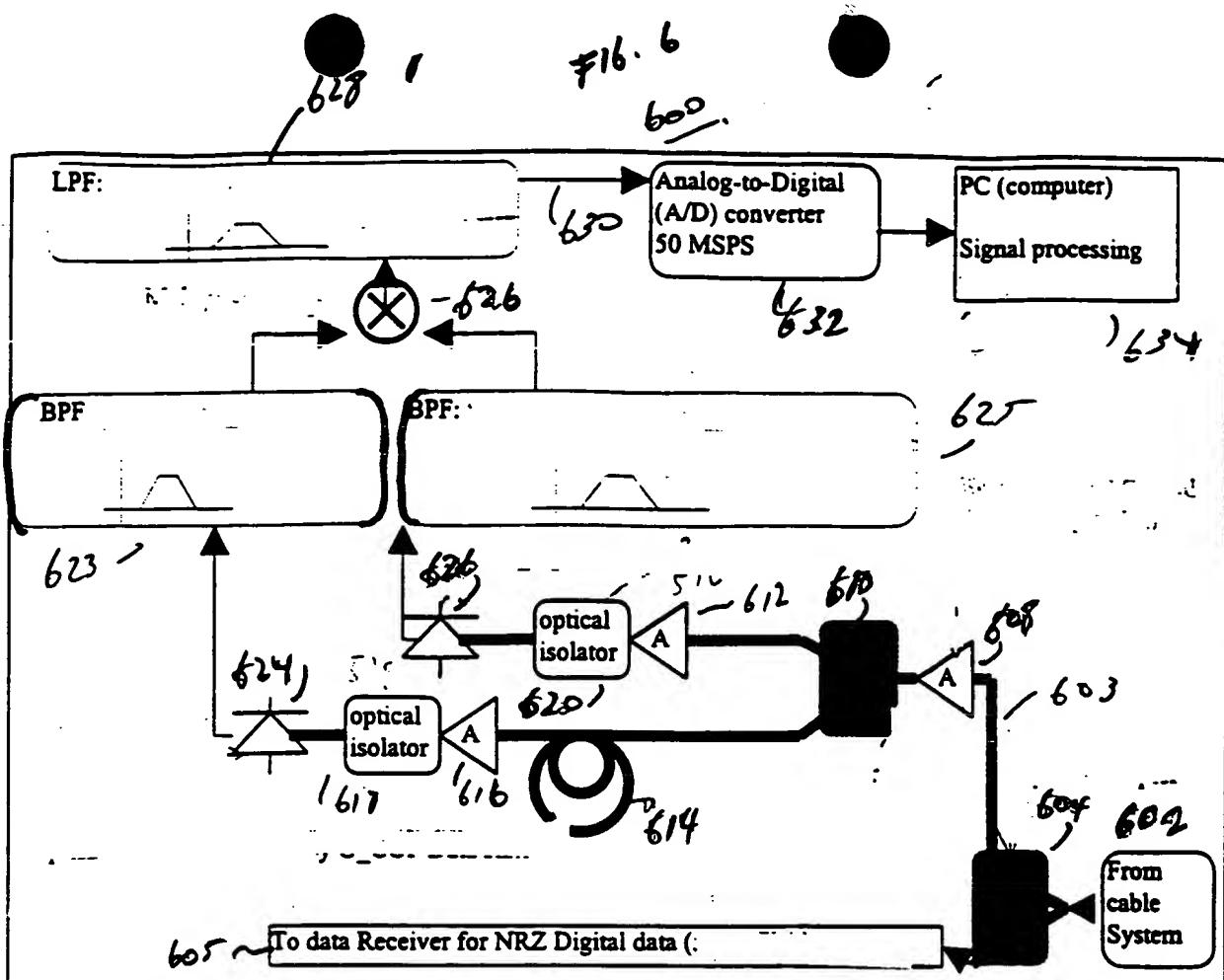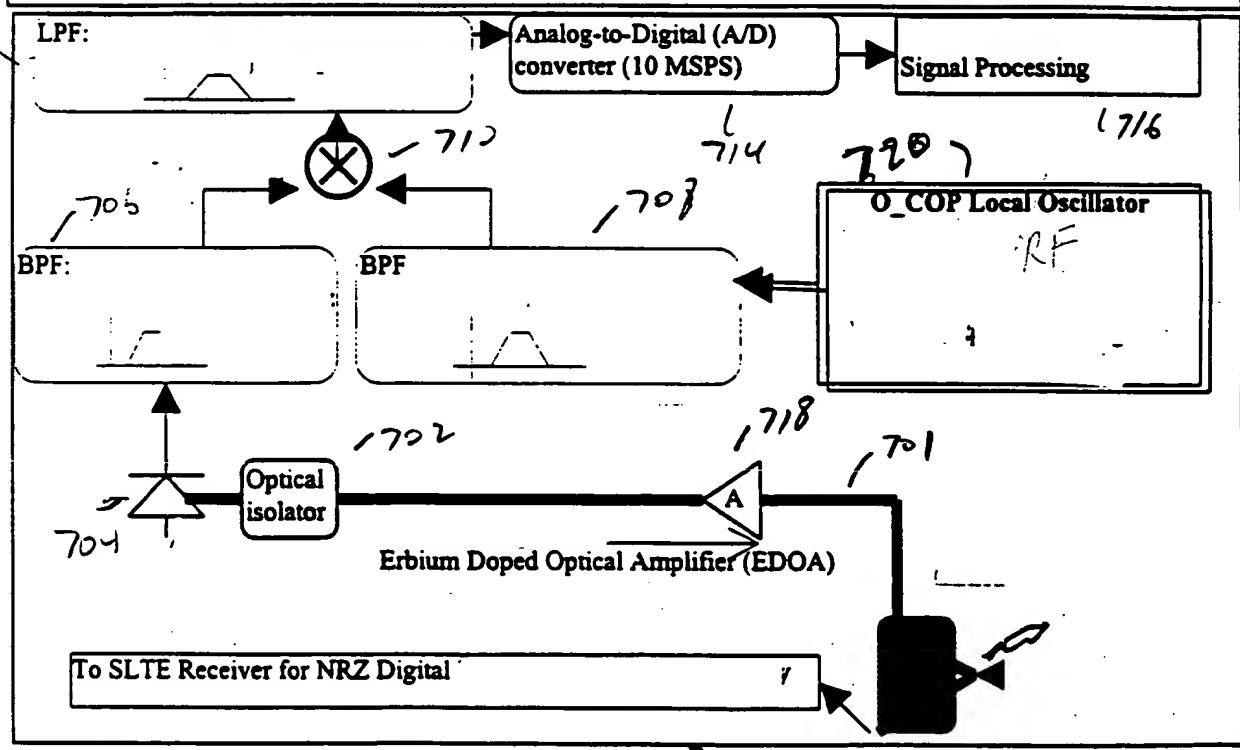Erbium Doped Optical Amplifier (EDOA)

To SLTE Receiver for NRZ Digital

Figure

FIGURE 8

800

Initialize Input Parameters:

s1: minimum distance between repeaters
s2: maximum distance between adjacent end-to-end OCOP locations
ω: OCOP clock rate
δ: optical delay

810

Compute bits per packet:
b

820

Compute packet spread:
$p = b / (\omega\delta)$

830

Compute # of packets:
$n = (2*s2) / p$

840

Compute inter-packet transmission time:
$T_{next} = n * (b / \omega)$

850

Start timer:
$T_{elapsed} = 0$

860

Measure noise and store in array NOISE

865

Is $T_{elapsed} > T_{next}$?

870

no

yes

Start timer:
$T_{elapsed} = 0$

875

Measure repeated data and store in array Z

880
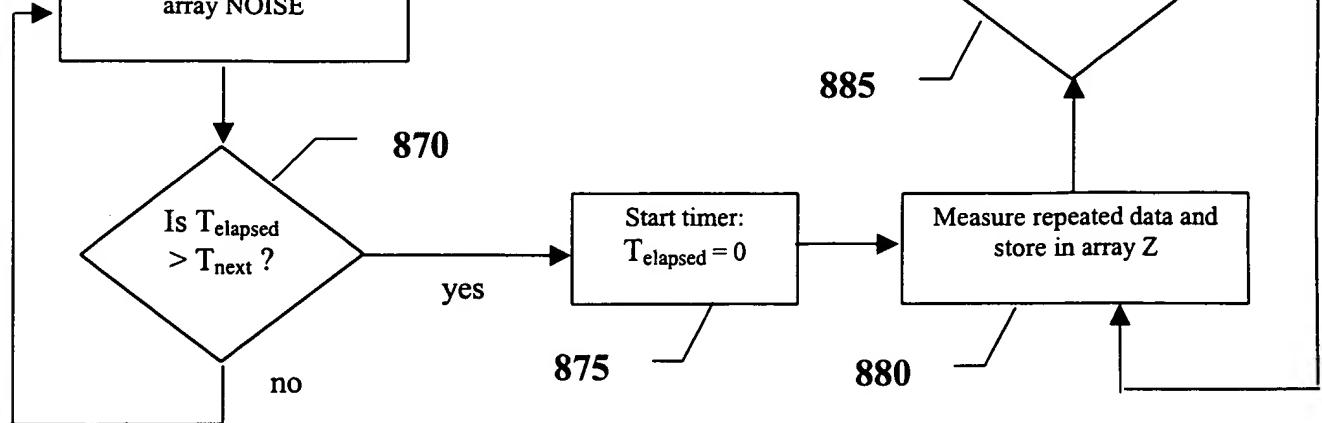
Is $T_{elapsed} > T_{next}$?

885

no

yes

END

890

900

Compute convolution
matrix **repeatern** of the
measured noise **outn** — 910

Compute convolution
matrix **repeater** of the
measured repeater data
out — 920

Apply Integrate and
Dump algorithm to
repeatern and store
result in matrix **out1n** — 930

Apply Integrate and
Dump algorithm to
repeater and store result
in matrix **out1** — 940

Compute repeater
autocorrelation matrix **a** :

a = out1 − out1n — 950